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PITTMAN, AUDREY LAVERNE. Comparison of Space and Facilities in Mobile Homes and Public Housing by Selected Recommended Standards. (1969)  
Directed by: Dr. Jane H. Crow pp. 65

The objectives of this study were to (1) investigate the facilities available in mobile home units currently on the market and in existing public housing units in Greensboro, North Carolina, (2) evaluate these housing units for adequacy of space in relation to recommendations published by the American Public Health Association-Public Health Service, the Illinois Small Homes Council, and the Federal Housing Administration, (3) compare space adequacy and facilities of the two types of housing units evaluated.

The lowest priced two, three, and four bedroom mobile home units were selected from each of the dealers in Greensboro, North Carolina. Data pertinent to the public housing units were obtained from blueprints of these units constructed by the Greensboro Public Housing Authority in each of the four developments having two, three, and four bedroom units. Twenty-one mobile homes and 12 public housing units were examined and data recorded on a checklist developed from selected published recommended housing standards.

Generally, the same type equipment was found in both types of housing units; however, refrigerators were larger in mobile homes than in public housing units.

When total space in the two types of housing units was evaluated, the majority of the mobile homes had space for six occupants, while public housing units had total space sufficient for six to eight occupants. Bedroom space in mobile homes was sufficient for occupancy by one to four persons while public housing units had bedroom space in

amounts sufficient for four to seven persons. Combined closet hanging space was adequate for four to nine persons in both mobile homes and public housing units. General storage space was adequate in public housing units and deficient in all mobile homes. HOMES AND PUBLIC

Window space in all rooms except bathrooms in mobile homes met the recommended standard in both types of housing units evaluated.

Kitchen activity space was more adequate in mobile homes than in public housing, even though the total square footage of kitchen space was greater in public housing units. Specifically, base cabinet frontage, space on the latch side of the refrigerator, and space for mixing food were more adequate in mobile homes. Both wall and base storage space in kitchens were more adequate in mobile homes than in public housing. A Thesis Submitted to

Based on the recommended standards used in this study, it was concluded that the mobile homes evaluated supplied space in amounts sufficient for families of two to six in size. The public housing units met total space recommendations for six to eight occupants. Mobile homes had better planned work centers and storage space within the kitchen than did public housing units. May, 1969

Approved by

*James H. Gault*  
Thesis Advisor

APPROVAL SHEET

This thesis has been approved by the following committee of  
the Faculty of the Graduate School at The University of North Carolina  
at Greensboro.

COMPARISON OF SPACE AND FACILITIES IN MOBILE HOMES AND PUBLIC

HOUSING BY SELECTED RECOMMENDED STANDARDS

Thesis Adviser by Jane H. Chaw

Audrey Laverne Pittman

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A Thesis Submitted to  
the Faculty of the Graduate School at  
the University of North Carolina at Greensboro  
in Partial Fulfillment  
of the Requirements for the Degree  
Master of Science in Home Economics

Greensboro  
May, 1969

April 25, 1969  
Date of Examination

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# APPROVAL SHEET

## ACKNOWLEDGEMENTS

This thesis has been approved by the following committee of the Faculty of the Graduate School at The University of North Carolina at Greensboro.

would have been impossible. Sincere thanks and grateful appreciation are extended to Mrs. Savannah Day, Mrs. Nancy Holmes, Dr. Anna Reardon, and Dr. Rebecca Smith who gave constructive criticisms and helpful suggestions throughout.

The writer Thesis Adviser

Jane H. Crow

the officials at the public house authority who furnished information and data.

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The writer is grateful also to the mobile home dealers and the officials at the public housing authority who furnished information and data.	8
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used as a more readily available permanent housing unit for these families? At their present rate of growth they could dominate the low cost housing market by 1970. Since 1960, mobile homes have accounted for approximately seven per cent of the total number of housing units

## CHAPTER I

### INTRODUCTION

The lack of adequate housing is one of the more serious problems facing our nation today. It is most serious for the low-income family. The 1968 Statistical Abstract indicated that almost 15 per cent of this nation's population had incomes of less than \$3,000. Many low-income families reside in substandard houses, chiefly because they are financially unable to purchase or rent any other type of housing unit.

In a housing market analysis recently conducted in Greensboro and Guilford County (June 1968) it was reported that the Greensboro housing supply is lacking in low price rental and sales units.

Experts feel that housing is one of the most critical social problems with which families currently are confronted. Whitney Young, Jr. (December 1965) stated "the most critical weakness of the anti-poverty war is its housing component [p. 586]."

With the advent of urban renewal, many families have been forced to move from slum areas, often into areas of a city offering less than desirable housing. Mobile homes are presently being used as temporary housing units for some families in urban renewal areas. Could they be used as a more readily available permanent housing unit for these families? At their present rate of growth they could dominate the low cost housing market by 1970. Since 1960, mobile homes have accounted for approximately seven per cent of the total number of housing units

constructed in the United States. It is estimated that one and one-half million families are currently living in mobile homes.

Mobile home manufacturers have been the innovators of many techniques currently used in the housing construction industry. Radigan (1968) has said that because of its manufacturing facilities, marketing, purchasing, and the technical organizations already available, the mobile home industry is in an excellent position to meet the need for low cost housing. A recent editorial in American Builder (Kizzia, 1968) stated that "with the possible exception of mobile homes there is no low cost house [p. 78]." With the speed and precision allowed by the mobile home construction techniques, could they be utilized as permanent housing units for low-income families? Would they offer a solution to the housing problems facing our low-income families?

#### Purpose

This study was designed to evaluate the adequacy of space and facilities of mobile homes for meeting the housing needs of low-income families. Do mobile homes offer adequate space? Do mobile homes meet existing recommended standards for adequate housing (natural and artificial light, plumbing, heating, ingress and egress, storage, and work space)?

An answer to these questions should offer a partial solution to the housing adequacy problem faced by low-income families in this nation.

The objectives of this study were to:

1. Investigate the facilities available in mobile home units currently on the market and existing public housing units in Greensboro, North Carolina.



2. Evaluate these housing units for adequacy of space in relation to minimum standards recommended and published by the American Public Health Association-Public Health Service, the Illinois Small Homes Council, and the Federal Housing Administration.
3. Compare space adequacy and facilities of selected new mobile homes currently available in Greensboro, North Carolina, with existing public housing dwelling units in that city.

#### Definition of Terms

Low-income is used to describe families of 2 persons with an income of \$2,000 or less and 3-7 persons with an income of \$2,000 plus \$500 for each additional member beyond two.

Adequate housing is housing space and facilities meeting the standards utilized in this study.

Mobile home is defined by the Mobile Home Manufacturers Association (1968) as a "movable or portable dwelling constructed to be towed on its own chassis, connected to utilities and designed without a permanent foundation. It can consist of one or more units that can be telescoped when towed and expanded later for additional capacity, or two or more units, separately towable but designed to be joined into one integral unit."

#### Limitations of the Study

This study was limited to mobile homes and public housing facilities available in the Greensboro, North Carolina area, in the belief that they were representative of the quality and quantity of

these types of housing available nationally.

### Basic Assumptions

1. The economic status of low-income families limits their ability to purchase or rent an adequate conventional housing unit.
2. There is a shortage of adequate housing units available to the low-income family in our society.
3. Minimal space needs of low-income families are no different from those of any other families of identical size.

Housing, however, is more than a complex product. It is both an economic and social process, and has highly significant social implications because it provides shelter for our basic social unit--the family. According to Beyer (1968) almost every person is affected in his day to day living by the kind of house in which he lives.

Since every family differs from another, its housing uses and needs are individual. There are, however, some common requirements for housing; it should provide comfort, contentment, health, and aesthetic satisfactions.

The Housing Act of 1949 set our nation's standards in broad, general terms when it established the goal of a "decent home and suitable living environment for every American family." This statement from the Act's preamble had as one of its significant aspects the emphasis on both home and environment. The Federal Housing Administration (1965) stated the purpose of the National Housing Act

## CHAPTER II

### REVIEW OF LITERATURE

Housing is basically a highly complex, bulky, durable, and permanent product. Housing, unlike many other industrial products is not highly standardized. Many types of materials are used both in the structure and in the furnishings, and various parts and facilities are utilized. Beyer (1965) has said that modern technology is producing newer and better housing components and building techniques daily.

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is "to encourage improvement in housing standards and conditions."

A nation should strive to provide houses which assure at least a minimum standard for quality and facilities to all citizens. Existing housing standards reflect minimum situations or a level below which housing is considered unsafe, unsanitary, or inadequate.

Agencies and organizations concerned with housing standards have as a common concern and objective the improvement of home and environment. They have accepted the fact that housing has a tremendous effect on every member of an American family and this acceptance has motivated more interest in housing conditions.

Beyer (1965) has stated that one of the most significant features of a well designed house is the distribution of space in that house so that it may be economically, efficiently, and practically used, and may afford the maximum of living comfort and convenience.

The most inclusive set of standards utilized in this study was the Minimum Property Standards of the Federal Housing Administration (1965) which help assure well-planned, safe, and soundly constructed homes. One of its primary objectives is to stimulate the development of new ideas, techniques, and materials which will be beneficial to American families in the form of better and more economical housing. The Mobile Home Manufacturers Association (1967) standard for plumbing, heating, and electrical equipment has recently been expanded to include construction standards. This new standard has been accepted by the United States of America Standards Institute as A119.1. A mobile home which bears the MHMA seal has met this industry accepted standard. The Kitchen Planning Standards developed by the Illinois Small Homes



Council (1949; 1965) include detailed dimensions dealing with counter, work, storage, and activity space. The American Public Health Association-Public Health Service recommendations (1967) are detailed as to the total space, space per inhabitant, electric service, and facilities installed. These last two sets of standards are totally voluntary.

#### Total Space Standards

The American Public Health Association-Public Health Service (1967) **Recommended Housing Maintenance and Occupancy Ordinance** gives careful descriptions of space requirements within a house. This guide gives the minimum space requirements of one hundred fifty square feet of floor space for the first occupant and one hundred square feet of floor space for each additional occupant. The total number of persons in a housing unit should not exceed two times the number of habitable rooms in the unit.

The Minimum Property Standards for Low Cost Housing (1967) specifies that each living unit shall be provided with space necessary to assure adequate storage and sanitary facilities as well as suitable living, sleeping, cooking, and dining accommodations. The space shall be planned to permit placement of furniture and essentials within the living unit.

The recommendations of APHA-PHS (1967) stipulate that every housing unit of two or more rooms should have a minimum of seventy square feet of floor space in rooms utilized for sleeping purposes. Each additional occupant would require another fifty square feet of floor space.

### Ceiling Height and Window Space

APHS-PHS (1967) states that the ceiling height of any habitable room shall be seven feet. Every habitable room shall have at least one window facing outdoors and minimum window area shall be at least ten per cent of the total floor area of the room. The total openable window area shall be at least forty-five per cent of the minimum window area size. Under standards adopted in January, 1968 by the Mobile Home Manufacturers Association, the same requirements must be met in order for a manufacturer to affix the MHMA seal to a unit.

### Facilities

APHA-PHS standards (1967) recommend minimum mechanical facilities for heating, plumbing, and electrical facilities. These standards call for a room with flush water closet, lavatory, sink, and shower and/or tub. Every habitable room within a housing unit shall have an electric service and outlets or fixtures capable of providing at least three watts per square foot of total floor area. Every unit shall have a heating system properly installed, and capable of providing safe and adequate heating for all habitable rooms. This heating unit must be capable of maintaining a temperature of at least 68 degrees Fahrenheit at a distance of 18 inches above floor level under ordinary winter conditions.

The MHMA has for several years operated under a minimum standard for plumbing, heating and electrical equipment. The MHMA standard (1967) states that a certificate must be permanently affixed inside the home to attest the lowest outside temperature at which the furnace installed

will maintain 70 degrees Fahrenheit inside temperature. The code also states that heat loss must not exceed 50 BTUs per hour per square foot of floor space.

### Closet Storage

Adequate closet storage was a facility included in all minimum housing standards utilized. The APHA-PHS standards (1967) state that each occupant of a dwelling unit shall have at least four square feet of floor to ceiling closet space. However, the FHA Minimum Property Standards for Low Cost Housing (1967) are somewhat less. They require only one closet for each bedroom, or a minimum size of 1'10" by 3'0". The height must be at least 5'0" and the lower shelf must not be over 74 inches above the floor of the room. The MHMA standard (1967) calls for "adequate storage space" but does not specify dimensions.

FHA's low cost housing standards require a linen closet providing a minimum shelf area of eight square feet near the bedroom area and a closet near the living area for coat storage. APHA-PHS standards (1967) specify that each dwelling unit shall have a suitable facility for the safe storage of drugs and household poisons. The FHA standards for low cost housing require that usable general storage for the storage of items and equipment essential to the use of the occupants be provided. This space must be a minimum of 50 cubic feet of basic storage plus 50 cubic feet additional storage per bedroom.

### Kitchen Storage and Work Space

The APHA-PHS housing ordinance (1967) states that every dwelling unit shall have a room or portion of a room in which food can be prepared and cooked. This room shall have a kitchen sink in good working order



which is provided with heated and unheated running water under pressure. Cabinets and/or shelves for the storage of eating, drinking, and cooking equipment and utensils are required. These cabinets and shelves shall be adequate for the permissible occupancy of the dwelling unit and shall be of sound construction, furnished with surfaces that are easily cleaned and will not impart any toxic or deleterious effect to food. This room shall also contain a stove for cooking food and a refrigerator for the safe storage of food at temperatures less than 50 degrees Fahrenheit but not lower than 32 degrees Fahrenheit.

The FHA standards for low cost housing (1967) specify that each kitchen shall have storage space for food and utensils and space for such activities and equipment needed to perform the intended function. Each kitchen shall have a minimum shelf area of 30 square feet in wall and base cabinets, with not less than 10 square feet in either. The minimum amount of drawer area is five square feet. Counter top area must be seven square feet, excluding the area occupied by the sink and cooking units. Doors on base or wall cabinets are not required but provisions shall be made so that doors can be added to base cabinets and at least one-half of the wall cabinets.

The Illinois Small Homes Council (1965) gives more detailed kitchen planning standards in circular C5.32. The basic requirements of a kitchen, according to this standard, include adequate storage, appliance space, counters, and activity space, all arranged for optimum efficiency according to size of housing unit: minimum (under 1,000 square feet), medium (1,000 to 1,400 square feet), and liberal (over 1,400 square feet). Hereafter the abbreviations (min.), (med.), and



(lib.) shall be used to designate these housing units.

The length of accessible base cabinet front is known as "base cabinet frontage" and is an initial measure of the adequacy of kitchen storage. The recommended standards for total base cabinet frontage as given by the Illinois Small Homes Council (1965) are: six feet (min.), eight feet (med.), and ten feet (lib.). The typical wall cabinet is 30 inches high with three fixed shelves. Wall cabinets should be placed 15 inches above the counter to allow ample room for a mixer or other equipment to be used on the counter. For convenience in daily use, the third shelf of all wall cabinets should not be more than 6 feet from the floor. Wall cabinets over the range, sink, and refrigerator are either inaccessible and/or unsafe and should not be included when calculating the amount of wall space.

#### Counter Space

The Illinois Small Homes Council (1965) recommends that counter frontage be distributed to provide counter space on both sides of the sink and adjacent to all appliances. The amount of space recommended for the latch side of the refrigerator is 15 inches (min. and med.) or 18 inches (lib.). Space for stacking dishes should be on the right side of the sink and should be 24 inches (min.), 30 inches (med.), or 36 inches (lib.). Eighteen, 24, or 30 inches are recommended on the left side of the sink. Some space should be allowed in the assembly area for mixing and food preparation; it should be 36 inches (min. and med.) or 42 inches (lib.).

### Activity Space in Kitchen

Adequate space must be allowed for access and work area. The Illinois Small Homes Council Kitchen Planning Standards (1965) states that the access space between cabinets or appliances at right angle to each other and requiring access to one side, should be 38 inches (lib.), and 30 inches (med. and min.).

The recommended clearance for work area between base cabinets or appliance opposite each other is sixty inches (lib.), 54 inches (med.), or 48 inches (min.). The same clearance is required from a counter front to a table, wall, or to the face of a storage wall, if the space is a work area. The liberal space allows room to walk past; the lesser clearance allows room to edge past.

McCullough (1949) developed specific recommendations for kitchen cabinet space. These standards relate to the cabinet space needed in small or moderate cost houses and are planned around a limited and liberal number of items to be stored. The limited list of supplies consists of basic foods and equipment needed to provide meals for an urban family of four. The liberal list has a larger variety of each type of supply. Both lists provide sufficient supplies for the homemaker to prepare and serve meals without wasting time or motion. Items and number of each included in the two lists are:

	limited	liberal
packaged foods	100	156
fresh foods	6	8
utensils	84	114
cleaning supplies	9	12

### Use of Mobile Homes for Low-Income Housing

According to the MHMA (June 1968a), there are approximately 220 firms producing mobile homes, and 7,000 retail outlets engaged in the sale of these units. In Guilford County, North Carolina, there are twenty retail outlets handling units from approximately sixty different manufacturers.

Currently mobile homes are the only housing unit available for less than \$10,000, and in 1967 nearly one in every four (23 percent) single family housing starts was a mobile home. According to the MHMA (June 1968a) seventy-five per cent of all family housing units valued at less than \$12,500 were mobile homes. A recent article in the Greensboro Daily News (August 29, 1968) stated that in 1968 an estimated 13 million people were living in mobile homes and by 1980 the number of people who own these units is expected to reach 30 million.

The Housing and Urban Redevelopment Act of 1968 (House and Home, September, 1968) signed by President Lyndon Johnson on August 1 is seen as the most ambitious housing bill in this nation's history. The three year, \$5.3 billion package aims at ridding the nation of substandard housing within the next ten years. This bill envisions the building or rehabilitation of 26 million units over the coming decade, with six million planned for low and moderate income families. It provides subsidized 1% mortgages for families making \$3,000 to \$7,080 annually and will enable more of this nation's poor to own homes. In addition, the bill provides for subsidized rent to families of the same income group. These two provisions are expected to yield 1,200,000 housing units.



This recently passed bill expressed a goal of 300,000 additional low cost housing units during 1969.

While it is not apparent how mobile home units will fit into this large, low cost shelter demand, both private and federal observers have recently indicated that a large portion of this need can be filled only by use of factory techniques. E. L. Wilson, Managing Director, MHMA, recently expressed the opinion that the mobile home industry is on the threshold of providing to urban Americans manufactured housing at less than \$10,000 per unit (Washington Highlights, March 1968).

The mobile home industry has been working closely with the federal government to provide this low cost housing. Financing of mobile home units is similar to financing automobiles, and down payments range from 20-30 percent with the balance paid in monthly installments (MHMA, June 1968).

House and Home, June 1968, reported that the FHA, under direct pressure from President Johnson, is charged with activity that will triple low-price housing production. As a result FHA is investigating industrialized housing. Its goal of a house, including land, priced at \$5,000 has been achieved only by mobile home manufacturers. Currently one manufacturer is producing a three bedroom unit which meets requirements for FHA 25 year mortgage insurance. Three other companies are in the process of developing units to qualify for this mortgage from FHA (House and Home, September 1968).

Radigan (1968) stated that in the area of fixed-site, low-income housing, the industry continues to explore techniques for town house



and "high-rise" walk up apartments, which could provide considerable savings to low and median income groups.

#### PROCEDURE

This study was designed to gain information about the space and facility adequacy of mobile homes, with the thought that they might be utilized as permanent housing for low-income families. An evaluative device was developed for use in collecting data pertinent to the objectives of this investigation.

Data secured relative to general characteristics of the mobile home unit included price, (furnished and unfurnished), brand, MHMA certification, facilities, and electric service installation. Facilities included range, vented heat, refrigerator, cooling system, plumbing, water heater, and its capacity. Additional and more detailed data included space, number of bedrooms and space in each, window space, closet space, drug and linen storage, and general storage in the unit. Kitchen work space and cabinet frontage were evaluated in terms of space on (a) latch side of refrigerator, (b) right side of sink, (c) left side of sink, (d) side of range for setting food, and (e) space for mixing food. Storage space in the serve-range and sink-mix center and storage space for dinnerware were also evaluated.

Four mobile homes and three public housing units of different sizes were used in pretesting the checklist. A sample of the revised

### CHAPTER III

#### PROCEDURE

This study was designed to gain information about the space and facility adequacy of mobile homes, with the thought that they might be utilized as permanent housing for low-income families. An evaluative device was developed for use in collecting data pertinent to the objectives of this investigation.

Data secured relative to general characteristics of the mobile home unit included price, (furnished and unfurnished), brand, MHMA certification, facilities, and electric service installation. Facilities included range, vented heat, refrigerator, cooling system, plumbing, water heater, and its capacity. Additional and more detailed data included space, number of bedrooms and space in each, window space, closet space, drug and linen storage, and general storage in the unit. Kitchen work space and cabinet frontage were evaluated in terms of space on (a) latch side of refrigerator, (b) right side of sink, (c) left side of sink, (d) side of range for setting food, and (e) space for mixing food. Storage space in the serve-range and sink-mix center and storage space for dinnerware were also evaluated.

Four mobile homes and three public housing units of different sizes were used in pretesting the checklist. A sample of the revised

checklist prepared and used in collecting data is given as Appendix A.

~~standards~~ The ten mobile home dealers in Greensboro, North Carolina, were contacted, and one visit was made to see the manufacturing process for mobile homes. Space and facility adequacy were evaluated, using the checklist devised, in each of the lowest priced two, three, and four bedroom units of each dealer. In some cases, a dealer did not have units of all three sizes available. There were 10 two bedroom units, eight three bedroom units, and three four bedroom units. Expandable and double wide units were not included in the study because none of the Greensboro dealers had these units on their lots.

Twelve existing public housing units were evaluated utilizing the same device, in order to make a comparison between space and facilities in existing public housing units and mobile homes. The public housing units were selected from NC 11-1, NC 11-2, NC 11-3, and NC 11-5, all areas developed as public housing developments in Greensboro, North Carolina. Blueprints for two, three, and four bedroom units located in each of these four areas were obtained and the information pertinent to this study was recorded.

#### Treatment of the Data

After the mobile homes and public housing units were measured, data were coded and transferred to data sheets, preparatory to determining the amount of deviation from the standards used. After deviations were calculated tables were prepared which show range of deviations and

frequency listings of those meeting, failing to meet, and exceeding standards for each of the items evaluated. Findings of the study were descriptively analyzed and reported.

## FINDINGS

Findings are here discussed as facilities, which includes equipment, electric service, and drug storage; occupancy data; and window, storage, and kitchen activity space. Data discussed in this chapter appears as Appendix B.

### Facilities

Equipment. All mobile homes evaluated had 30 inch ranges; in all but one, gas was the fuel used. All the ranges were of the conventional free standing type. All public housing units studied had 20 inch apartment type gas ranges of the conventional free standing type. All had hot water heating systems and gas water heaters.

The mobile homes were equipped with gas or oil furnace heating systems, with one exception of an electric furnace. These heating units were constructed with ducts leading to each room. The public housing units were heated by a ductless, gas, exposed flame heater, which was located in a hallway or living room.

Neither the mobile homes nor public housing units were equipped with any type cooling systems.

All mobile home units included an electric refrigerator, usually 12-14 cubic feet in capacity. The public housing units were equipped



with nine cubic foot conventional refrigerators.

Approximately one-half of the mobile homes were equipped with automatic washers. Five others had electrical connections, plumbing

## CHAPTER IV

facilities, and space allotted for a washer. Two units had both a

### FINDINGS

Findings are here discussed as facilities, which includes equipment, electric service, and drug storage; occupancy data; and window, storage, and kitchen activity space. Data discussed in this chapter appears as Appendix B.

Facilities mobile home units included had a water heater installed.

Equipment. All mobile homes evaluated had 30 inch ranges; in all but one, gas was the fuel used. All the ranges were of the conventional free standing type. All public housing units studied had 20 inch apartment type gas ranges of the conventional free standing type. All but two public housing units had gas water heaters.

The mobile homes were equipped with gas or oil furnace heating systems, with one exception of an electric furnace. These heating units were constructed with ducts leading to each room. The public housing units were heated by a ductless, gas, exposed flame heater, which was located in a hallway or living room.

Neither the mobile homes nor public housing units were equipped with any type cooling systems.

All mobile home units included an electric refrigerator, usually 12-14 cubic feet in capacity. The public housing units were equipped

with nine cubic foot conventional refrigerators.

Approximately one-half of the mobile homes were equipped with automatic washers. Five others had electrical connections, plumbing facilities, and space allotted for a washer. Two units had both a washer and dryer installed, and four others had neither space nor facilities for laundry equipment. None of the public housing units had washers or dryers installed, nor was space planned particularly for them.

All mobile home units included had a water heater installed. Its capacity varied, but not in any pattern related to size of unit or to number of bedrooms (see Table 1). Water heaters ranged in size from 17 to 40 gallon, with the majority of the units having 20 gallon water heaters. Over 70% of the units were equipped with electric water heaters. All but two public housing units had gas water heaters installed in them. These also varied in size, but not in relation to the size of the housing units. The largest units had 40 gallon heaters, while the two and three bedroom units had 20 or 30 gallon water heaters.

Electric service. In all cases both the mobile home and public housing units far exceeded the electric service requirements. Mobile home units had service entrances capable of supplying from 4400 to 6000 watts, while public housing supplied 4400 to 6600 watts.

All units, both mobile home and public housing, had at least one light fixture per room, and wall and floor outlets located four

TABLE 1

## Water Heater by Type and Capacity

Mobile Homes	17 gal. gas	17 gal. elec.	20 gal. gas	20 gal. elec.	30 gal. gas	30 gal. elec.	40 gal. gas
Two bedroom (N 10)	1	2	2	1	2	2	
Three bedroom (N 8)	1	2				5	
Four bedroom (N 3)				2		1	
Public Housing							
Two bedroom (N 4)			3		1		
Three bedroom (N 4)					4		
Four bedroom (N 4)						2	2

Standards used in the evaluation of space in bedrooms recommend 70 square feet of floor space for the first occupant and 50 square feet of floor space for each additional occupant. Closet space recommendations are 4 square feet of hanging space, 72" above the floor, per room occupant. In addition, 50 cubic feet of general storage space per bedroom is recommended.

Maximum Occupancy Based on Total Space. When total space of units was evaluated and maximum occupancy considered, two-thirds of the

to six feet apart. These facilities were adequate to meet the minimal standard.

Drug storage. Slightly over one-third of the mobile home units had spaces considered by the investigator to be safe and adequate for the storage of drugs. These spaces were shelves and cabinets which were out of reach of small children. None of the spaces had locks, but all could be equipped with a lock of some sort. The public housing units were all equipped with a conventional medicine cabinet which was located above the lavatory in the bathroom. None of the medicine cabinets had locks, and locks could not be easily installed on them.

#### Occupancy Data

The standard used to evaluate total floor space recommends that housing units have 150 square feet of floor space for the first occupant and 100 square feet of floor space for each additional occupant. Standards used in the evaluation of space in bedrooms recommend 70 square feet of floor space for the first occupant and 50 square feet of floor space for each additional occupant. Closet space recommendations are 4 square feet of hanging space, 72" above the floor, per room occupant. In addition, 50 cubic feet of general storage space per bedroom is recommended.

Maximum Occupancy Based on Total Space. When total space of units was evaluated and maximum occupancy considered, two-thirds of the



mobile home units in the study could accommodate six occupants (see Table 2). Approximately one-seventh supplied total space adequate for five occupants and the remainder had space adequate for three or four. Two-thirds of the public housing units met minimum total space recommendations for eight occupants and the remaining one-third supplied space adequate for six and seven persons.

TABLE 2

## Maximum Occupancy Based on Total Space

Number Occupants	Mobile Homes (N 21)	Public Housing (N 12)
Three	1	
Four	2	
Five	3	4
Six	14	2
Seven	1	2
Eight	5	8

Maximum Occupancy Based on Total Hanging Space in Closets. Over one-half of the mobile home units evaluated had combined closet hanging space adequate for at least six occupants; the remainder had closet hanging space in a quantity sufficient for at least four occupants. Two public housing units met closet hanging space recommendations for five, six, seven, and eight occupants each, while four of this type unit supplied space sufficient for four occupants (see Table 3).

TABLE 3  
Maximum Occupancy Based on Total Closet Hanging Space in Unit

Maximum Occupants	Mobile Homes (N 21)	Public Housing (N 12)
Four	5	4
Five	4	2
Six	4	2
Seven	5	2
Eight	3	2

Maximum Occupancy Based on Total Space by Number of Bedrooms.

Fifty percent of the two bedroom mobile home units had total space adequate for six occupants, twenty percent had space for four, and twenty percent had space for five occupants (see Table 4). One model of the two bedroom mobile home units had total space adequate for only three people. Seventy-five percent of the three bedroom mobile home units had total space adequate for six occupants, while 12.5% had space for five, and an identical proportion was adequate for seven occupants. All four bedroom mobile homes examined had total space which met the standard for six occupants.

One-half of the two bedroom public housing units met minimal total space for occupancy by six persons and the other one-half met total space requirements of occupancy by seven people, according to standards utilized in this study. All of the three and four bedroom public housing units met minimal total space standards for occupancy by eight persons.

Maximum Occupancy Based on Hanging Space in Closets by Number of Bedrooms. Sixty percent of the two bedroom mobile home units supplied closet space adequate for five to six occupants, and 40% had closet space adequate for only four (see Table 4). Fifty per cent of the three bedroom mobile home units had closet space sufficient for seven people. Approximately 12% of the units this size had closet space adequate for four, five, six, and eight occupants. The four

TABLE 4

Maximum Occupancy Based on Total Space and Hanging Space  
in Closets by Number of Bedrooms

		O C C U P A N T S					
MOBILE HOMES		3	4	5	6	7	8
Two Bedroom Units (N 10)							
Total space		1	2	2	5		
Hanging space in closets			4	3	3		
Three Bedroom Units (N 8)							
Total space				1	6	1	
Hanging space in closets			1	1	1	4	1
Four Bedroom Units (N 3)							
Total space					3		
Hanging space in closets						1	2
PUBLIC HOUSING							
Two Bedroom Units (N 4)							
Total space					2	2	
Hanging space in closets			4				
Three Bedroom Units (N 4)							
Total space							4
Hanging space in closets				2		2	
Four Bedroom Units (N 4)							
Total space							4
Hanging space in closets					2		2



bedroom units examined met the standard for hanging space in closets for either six or eight people.

All two bedroom public housing units evaluated supplied closet hanging space adequate for four occupants. One-half of the three bedroom units had such space sufficient for five, and one-half had closet space sufficient for seven occupants. The four bedroom public housing units had closet hanging space sufficient for either six or eight occupants.

Maximum Occupancy in Bedrooms Based on Square Footage.

Occupancy may be based on total square footage of interior space within units, and square footage per bedroom. This study determined occupancy based on both total square footage and space in bedrooms.

None of the mobile homes units had bedrooms large enough for two occupants when judged by the standards used in this study (see Table 5). Forty percent of the two bedroom mobile homes units met the recommended floor space standards for occupancy by one person in each of these rooms. None of the three and four bedroom units had all bedrooms meeting this recommended standard for occupancy by one person. Four of the larger units had two out of three and one had two out of four bedrooms which met floor space recommendations for one occupant.

In all public housing units, at least one bedroom met standards used in this study for minimum occupancy by one person (see Table 5). One-fourth of the two bedroom units had space in both bedrooms sufficient for double occupancy, and all units had the recommended space

TABLE 5

Maximum Occupancy in each Bedroom by  
Number of Bedrooms and Type Housing

Mobile Homes N 21	Public Housing N 12	Number Bedrooms in Unit	Space in each Bedroom per unit	
			Inadequate	Adequate for 1 person 2 persons
(N 10)	(N 4)			
3		Two	2	
4		Two	1	1
3		Two		2
	3	Two		1 1
	1	Two		2
(N 8)	(N 4)			
4		Three	1	2
4		Three	2	1
	2	Three		2 1
	2	Three		3
(N 3)	(N 4)			
2		Four	3	1
1		Four	2	2
	3	Four		3 1
	1	Four		2 2

for two occupants in at least one of its bedrooms. None of the three and four bedroom public housing units had all bedrooms large enough for double occupancy. However, one-half of the three bedroom units had one of the three bedrooms, and one-fourth of the four bedroom units had two of its four bedrooms adequate in space to meet double occupancy recommendations.

Maximum Occupancy Based on Total Space and Hanging Space in Closets by Number of Bedrooms. Generally, the mobile home units could accommodate a smaller number of occupants than could public housing units when evaluated on the basis of total space and closet hanging space (see Table 6). Sixty percent of the two bedroom mobile home units had total space and closet hanging space sufficient for five or six occupants, while approximately the same percentage of the three bedroom mobile home units had these spaces in amounts sufficient for six or seven occupants. All of the four bedroom units had total space and closet hanging space adequate to meet the standards recommended for six occupants.

The public housing units had total space and closet hanging space in amounts sufficient to accommodate from four to eight occupants. The two bedroom units could accommodate four or five, the three bedroom units, six or seven, and the four bedroom units could accommodate seven or eight occupants (see Table 6).

Maximum Occupancy Based on Total Space, Bedroom Space, and  
Hanging Space in Closets by Number of Bedrooms

Maximum Occupancy Based on Total Space and Hanging Space in Closets by Number of Bedrooms							
SIZE UNITS	MAXIMUM OCCUPANCY						
MOBILE HOMES	3	4	5	6	7	8	
Two bedroom (N 10)	1	3	3	3			
Three bedroom (N 8)		1	2	4	1		
Four bedroom (N 3)				3			
PUBLIC HOUSING							
Two bedroom (N 4)		2	2				
Three bedroom (N 4)				2	2		
Four bedroom (N 4)					2	2	

MAXIMUM OCCUPANTS							
MOBILE HOMES	1	2	3	4	5	6	7
Two bedroom (N 10)	1	5	4				
Three bedroom (N 8)		1	6	1			
Four bedroom (N 3)							
PUBLIC HOUSING							
Two bedroom (N 4)				4			
Three bedroom (N 4)				2	2		
Four bedroom (N 4)						4	



Maximum Occupancy Based on Total Space, Bedroom Space, and  
Hanging Space in Closets by Number of Bedrooms.

When housing units were evaluated on the basis of a combination of total space, bedroom space, and closet hanging space, the maximum total occupancy was considerably lower than when these items were considered individually (see Table 7). On this basis, only four mobile homes supplied space for four occupants; 10 supplied all these spaces in amounts adequate for three people, and six units met these requirements for two occupants. One-third of the public housing units supplied total space, bedroom space, and closet hanging space for seven occupants, while one-half supplied all these types of space in quantity adequate for four occupants. Other public housing units met these space requirements in amounts sufficient for five occupants.

TABLE 7

Maximum Occupancy Based on Total Space, Bedroom Space, and Hanging  
Space in Closets by Number of Bedrooms

	M A X I M U M O C C U P A N T S							
	1	2	3	4	5	6	7	8
<b>MOBILE HOMES</b>								
Two bedroom (N 10)	1	5	4					
Three bedroom (N 8)		1	6	1				
Four bedroom (N 3)				3				
<b>PUBLIC HOUSING</b>								
Two bedroom (N 4)				4				
Three bedroom (N 4)				2	2			
Four bedroom (N 4)							4	

### Window Space

The standard used for adequate window space was 10% of the square footage of floor space in a given room.

Living Room. Eighty percent of the two bedroom mobile home units had living room window space which met or exceeded the standard utilized in this study; the range of deviation was -16.6% to +492% (see Table 8). All three and four bedroom units had living room windows that exceeded the standard; this deviation was +283% in three bedroom units and +363% in the four bedroom units.

In public housing evaluated, all of the two and four bedroom units and 75% of the three bedroom units met or exceeded the standard utilized for evaluating window space in the living room. Deviation ranged from -9.5% to +36.3%.

Bathroom. None of the mobile homes had windows in the bath space that met the standard for this study. The range of deviation varied from -81.5% in three bedroom units to -85% in two bedroom units. Window space in all two bedroom public housing bathrooms met or exceeded the standard utilized in this study. Seventy-five percent of the bathroom windows in the largest units met or exceeded the standard. The range of deviation was greatest in bathrooms of three bedroom public housing units. When deficient, it was by approximately one-third and when in excess about 15%.

Bedroom. Forty percent of the two bedroom mobile home units had no windows in bedroom which met the standard space recommendation;

TABLE 8

## Window Space Deviation from Recommended Standard

MOBILE HOMES N 21	Two BR N 10 Number	Three BR N 8 Number	Four BR N 3 Number
<u>Window space</u>			
Living room			
meets	0	0	0
exceeds	3	8	3
fails to meet	2	0	0
range of deviation	-16.67% to +492%	0 to +283%	0 to +363%
Bathroom			
meets	0	0	0
exceeds	0	0	0
fails to meet	10	8	3
range of deviation	-85% to -25%	-81.5% to -52.4%	-84.1% to -78.3%
PUBLIC HOUSING N 12	N 4	N 4	N 4
<u>Window space</u>			
Living room			
meets	0	0	0
exceeds	4	3	4
fails to meet	0	1	0
range of deviation	0 to + 36.3%	-9.5% to +9.8%	0 to +29.87%
Bathroom			
meets	2	0	0
exceeds	2	3	3
fails to meet	0	1	1
range of deviation	0 to + 14.3%	-35.7% to +14.3%	-30.7% to +16.2%

thirty percent had all windows meeting these recommendations. In the three bedroom mobile home units, 37.5% had windows which met minimum space standards in all bedrooms (see Table 9).

#### Storage Space

TABLE 9

#### Bedrooms with Windows Meeting Minimum Space Recommendations

Number of Bedrooms	Mobile Homes (N 21)	Public Housing (N 12)
0	4	0
1 of 2	3	0
2 of 2	3	4
1 of 3	3	0
2 of 3	2	2
3 of 3	3	2
1 of 4	0	0
2 of 4	1	0
3 of 4	1	0
4 of 4	1	4

in this study met the general storage space recommendations (see Table 10).

General Storage in Bedroom. General storage space in bedrooms of the smallest mobile home units was inadequate in all cases except one; that one exceeded the recommended space by 34 cubic feet. All other units of both mobile and public housing were deficient in space for general storage (see Appendix B).



All bedrooms in the two and four bedroom public housing units had windows which met space recommendations. In three bedroom units, 50% had all bedroom windows meeting the minimum recommended space.

### Storage Space

Linen. Sixty percent of the two bedroom mobile homes met or exceeded the standard recommended for linen space (see Table 10). Units deviated from the standard for this type storage from -100% to +75%. Eighty-seven percent of the three bedroom mobile home units met but did not exceed the linen storage recommendations. One unit of that size had no facility for storing linens. Two-thirds of the four bedroom mobile home units exceeded the standard for linen storage space; the range of this deviation was -50% to +150%. In every case, public housing units had linen storage in excess of the space recommendations used in this study.

General Storage within Units. Eighty percent of the two bedroom mobile home units were deficient in general storage space, and all of the three and four bedroom mobile home units failed to meet the standard used for general storage space. All the public housing units included in this study met the general storage space recommendations (see Table 10).

General Storage in Bedroom. General storage space in bedrooms of the smallest mobile home units was inadequate in all cases except one; that one exceeded the recommended space by 34 cubic feet. All other units of both mobile and public housing were deficient in space for general storage (see Appendix B).

TABLE 10

## Storage Space Deviation from Recommended Standard

MOBILE HOMES N 21	Two BR N 10	Three BR N 8	Four BR N 3
	Number	Number	Number
<u>Storage space</u>			
<u>Linen</u>			
meets	4	7	0
exceeds	2	0	2
fails to meet	4	1	1
range of deviation	-100% to +75%	-100% to 0	-50% to +150%
<u>General</u>			
meets	0	0	0
exceeds	2	0	0
fails to meet	8	8	3
range of deviation	-100% to +22%	-100% to +4%	-50% to -28%
<u>PUBLIC HOUSING</u> N 12	N 4	N 4	N 4
<u>Storage space</u>			
<u>Linen</u>			
meets	0	0	0
exceeds	4	4	4
fails to meet	0	0	0
range of deviation	0 to + 300%	0 to +350%	0 to +250%
<u>General</u>			
meets	0	0	0
exceeds	4	4	4
fails to meet	0	0	0
range of deviation	0 to +460%	0 to + 650%	0 to +1020%

### Kitchen Activity Space

Data pertaining to kitchen activity space is presented in table 11, and discussed on the following pages.

Between Counters/Appliances at Right Angles. Only nine of the mobile home units included in the study had kitchens with arrangement of appliances or cabinets placed at right angles to each other. Over three-fourths of these units met or exceeded the standard requirement for space between appliances in this position. The range of deviation from the standards was -20% to +140%. Four of the public housing units had this type kitchen arrangement. Three-fourths of this number exceeded the standard; the others failed to meet it. The range of deviation was -41.14% to +52.94%.

Between Counters/Appliances Opposite Each Other. Two mobile homes and 5 public housing units had kitchens arranged so that appliances or counters were opposite each other. Neither of the mobile homes and only one of the public housing units met or exceeded the standard for space recommended in this area.

Between Dining Table and Wall or Counter Back. Over 40% of the mobile home units evaluated met or exceeded the standard for space from dining table to wall or counter. The deviation ranged from -84.6% to 84.6%. All public housing units included in the study failed to meet the standard for space requirements in this area. The maximum deficiency was -76.54%.

TABLE 11

## Kitchen Activity Space

SPACE, ACTIVITY	MOBILE HOME UNITS N 21	PUBLIC HOUSING UNITS N 12
Between Cabinets/Appliances		
At Right Angles	(N 9)	(N 4)
met standard	1	0
exceeded standard	6	3
failed to meet standard	2	1
range of deviation	-20% to +140%	-41.17% to +52.94%
Between Counters/Appliances		
Opposite Each Other	(N 2)	(N 5)
met standard	0	0
exceeded standard	0	1
failed to meet standard	2	4
range of deviation	-75% to -37%	-12.5% to +11.11%
Between Dining Table and Wall or Counter Back		
met standard	6	0
exceeded standard	3	0
failed to meet standard	12	12
range of deviation	-84.6% to +84.6%	-76.54% to -40.0%
Passageway Beside Table		
met standard	5	3
exceeded standard	5	0
failed to meet standard	11	9
range of deviation	-60% to +33.3%	-60% to -20%
Base Cabinet Frontage		
met standard	2	3
exceeded standard	17	2
failed to meet standard	2	7
range of deviation	-33.3% to +83.3%	-58.33% to +33.33%



## Kitchen Activity Space--Continued

SPACE, ACTIVITY	MOBILE HOME UNITS N 21	PUBLIC HOUSING UNITS N 12
Latch Side of Refrigerator		
met standard	0	0
exceeded standard	14	4
failed to meet standard	7	8
range of deviation	-100% to +93.3%	-100% to +60%
Right Side of Sink		
met standard	1	1
exceeded standard	5	3
failed to meet standard	15	8
range of deviation	-100% to +76.8%	-100% to +38.46%
Left Side of Sink		
met standard	2	4
exceeded standard	10	4
failed to meet standard	9	4
range of deviation	-83.3% to +122%	-100% to +66.6%
Space for Mixing Food		
met standard	2	0
exceeded standard	1	0
failed to meet standard	18	12
range of deviation	-100% to +5.0%	-100% to -16.7%
Range (for setting food)		
met standard	0	2
exceeded standard	13	4
failed to meet standard	8	6
range of deviation	-100% to +140%	-100% to +33.3%

## Kitchen Activity Space--Continued

	MOBILE HOME UNITS N 21	PUBLIC HOUSING UNITS N 12
Storage Space: Combined Centers		
Serve-Range Center: Wall		
met standard	0	2
exceeded standard	20	10
failed to meet standard	1	0
range of deviation	-100% to +433%	0 to +186%
Serve-Range Center: Base		
met standard	2	3
exceeded standard	5	0
failed to meet standard	14	9
range of deviation	-100% to +27.27%	-45.45% to 0
Sink-Mix Center: Wall		
met standard	4	2
exceeded standard	14	8
failed to meet standard	3	2
range of deviation	-87.5% to +250%	-25% to +116.6%
Sink-Mix Center: Base		
met standard	2	0
exceeded standard	4	1
failed to meet standard	15	11
range of deviation	-47.8% to +47.8%	-100% to +21.74%
Total: Wall		
met standard	0	0
exceeded standard	21	10
failed to meet standard	0	2
range of deviation	0 to +242%	-14.29% to +80.95%

# Kitchen Activity Space--Continued

	MOBILE HOMES UNITS N 21	PUBLIC HOUSING UNITS N 12
Total: Base		
met standard	1	1
exceeded standard	2	1
failed to meet standard	18	10
range of deviation	-52.94% to +29.41%	-84.7% to +5.88%
Dinnerware Storage Space		
met standard	0	4
exceeded standard	8	0
failed to meet standard	13	8
range of deviation	-100% to +242.8%	-100% to 0

Latch Side of Refrigerator. For space recommendations for the latch side of refrigerator, approximately two-thirds of the mobile home units exceeded the standard, and the remainder failed to meet it. The opposite was found in public housing units. Two-thirds of them failed to meet the standard for space beside the latch side of refrigerator and the remaining units exceeded it. The space deviated from the standard from -100% to +60%.

Right Side of Sink. Slightly over 70% of the mobile homes units did not meet standards for space on right side of sink. The range of deviation was -100% to +76.8. For this space, two-thirds of the public housing units failed to meet standards. Their range of deviation was -100% to +39.46%.

Passageway Space Beside Table. Passageway space beside the table was deficient in approximately one-half of the mobile homes. About one-fourth of the units met and one-fourth exceeded this standard. The range of deviation was -60% to +33.33%. Three-fourths of the public housing units failed to meet the standard for passageway space along the side of the table. The remainder met but did not exceed the standard. The maximum deficiency in these units was also 60%.

Base Cabinet Frontage. Ninety per cent of the mobile home units met or exceeded the standard for base cabinet frontage space. Deviation ranged from -33.33% to +83.33%. In public housing units, over one-half failed to meet the space standard for base cabinet frontage, while one-fourth met and almost one-fourth exceeded the space recommendations. The maximum deficiency was 58.33% and maximum excess was 33.33%.

Latch Side of Refrigerator. For space recommendations for the latch side of refrigerator, approximately two-thirds of the mobile home units exceeded the standard, and the remainder failed to meet it. The opposite was found in public housing units. Two-thirds of them failed to meet the standard for space beside the latch side of refrigerator and the remaining units exceeded it. The space deviated from the standard from -100% to +60%.

Right Side of Sink. Slightly over 70% of the mobile homes units did not meet standards for space on right side of sink. The range of deviation was -100% to +76.8. For this space, two-thirds of the public housing units failed to meet standards. Their range of deviation was -100% to +38.46%.



Left Side of Sink. Standards for space on left side of sink were met or exceeded in approximately 60% of the mobile home kitchens. Deviation ranged from -83.3% to +122%. In the public housing units, one-third each exceeded, met, and failed to meet the standard. Deviation in these units varied from -100% to +66.6%.

Space for Mixing Food. Eighty-five percent of the mobile home units failed to meet the standard recommended for mixing food; the range of deviation was -100% to +5%. None of the public housing units met or exceeded the standard for space recommended in the mixing area. Some kitchens in public housing completely lacked a center for mixing food.

Range (for setting food). A serve center beside the range was adequate, by the standard used, in over 60% of the mobile home kitchens. The remainder failed to meet the space recommendations used. This deviation ranged from -100% to +140%. Fifty percent of the public housing units failed to meet the standard for serving space beside the range. The other one-half met or exceeded it; of this group, two-thirds exceeded the standard.

#### Combined Storage in Kitchen Activity Centers

Recommendations for combined activity centers in the kitchen required storage space in both wall and base cabinets.

Serve-range center. All but one of the mobile home units exceeded the standard for wall cabinet storage space in the serve-range center. That one had no wall storage in that area. The maximum excess space was 433%. All the public housing units met or exceeded the standard for

storage space in the wall cabinets in this center. The maximum excess in this space was 186%.

Approximately two-thirds of the mobile home units failed to meet the standard recommended for base cabinet space in the serve-range center. The range of deviation was -100% to +27.27%. Three-fourths of the public housing units did not meet the standard for base cabinet space in this center. The maximum deficiency was 45.45%.

Sink-Mix Center. Eighty-five percent of the mobile home units met or exceeded the standard for wall storage space in the sink-mix center. The maximum deficiency was 87.5% and the maximum excess was 250%. Almost the same proportion of public as mobile housing units met or exceeded the standard. Deviations for public housing were less in both directions, -25% to +116.6%.

Over 70% of the mobile home units did not meet the standard for base cabinet storage in the sink-mix center. The range of deviation was +47.8%. All but one of the twelve public housing units were deficient in base cabinets in this center. Some of these units were 100% deficient in storage space in the sink-mix center.

#### Total Wall Storage

All the mobile home units exceeded the standard for total wall cabinet storage space in the kitchen. The maximum excess was 242%. Eighty-three percent of the public housing kitchens exceeded the standard for total wall cabinet space in the kitchen; the range of deviation was -14.29% to +80.95%.

### Total Base Storage

The standard for total base cabinet storage space is derived by adding the totals for each separate work center. This does not take into account overlapping use of work surfaces; therefore, this standard requires 2.5 feet more than the previously designated base cabinet frontage discussed on page 42.

Eighty-five percent of the mobile home kitchens failed to meet the standard utilized in evaluating total base cabinet storage space. Deviation ranged from -52.94% to +29.41%. Slightly over 80% of kitchens in public housing also did not meet this standard. Deviation ranged from -84.7% to +5.88%.

### Dinnerware Storage

Over 60% of the mobile home units failed to meet minimum space requirements for dinnerware storage. The range of deviation was -100% to +242%. Three-fourths of the public housing units were deficient when dinnerware storage space was evaluated against the standard utilized. The maximum deficiency for this space was 100% and no kitchen exceeded the minimum recommendations.

### Units Meeting Recommendations for Combined Base and Wall Storage Space in Serve-Range and Sink-Mix Centers

Although many of the units were deficient in storage space in specific areas in the kitchens, when the space for storage in the total area was combined and evaluated against the combined recommended space,

deficiency in one area was compensated for by excess in the other area. This occurred in 85% of the mobile homes surveyed in the serve-range centers (see Appendix C). Slightly over 40% of the public housing units met the standard for combined space in the serve-range center; however, those units which failed to meet this standard were only slightly deficient. Almost one-half of both the mobile home and public housing units met the combined base/wall recommendations for storage space in the sink-mix center.

Eighty-five percent of the mobile homes and 50% of the public housing units met this combined standard for total wall and base storage when space in the two sections was combined (see Appendix C).

Facilities and equipment varied among mobile homes and between mobile homes and public housing units. Generally, the same type of equipment was found in all units; however, refrigerators were larger in mobile homes than in public housing units. Heating systems and electrical service were comparable in the two types of housing. Water heater size varied more among mobile home units than among public housing units, but not in a pattern related to unit size.

Drug storage was considered adequate in one-third of the mobile homes and in all public housing units. Mobile homes utilized shelves and cabinets; public housing units had conventional medicine cabinets.

Maximum occupancy varied considerably between mobile homes and public housing (see Table 12). Different standards can be utilized to



TABLE 12

Maximum Occupancy by Bedroom Space, Total  
Space, Hanging Space

## CHAPTER V

## SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

Twenty-one mobile homes and 12 public housing units in Greensboro, North Carolina, were examined in the fall of 1968 to determine and compare the space and facility adequacy of them. These included two, three, and four bedroom units. They were evaluated on the basis of housing standards derived from published recommendations of the American Public Health Association-Public Health Service, Federal Housing Administration, and the Illinois Small Homes Council.

Facilities and equipment varied among mobile homes and between mobile homes and public housing units. Generally, the same type of equipment was found in all units; however, refrigerators were larger in mobile homes than in public housing units. Heating systems and electrical service were comparable in the two types of housing. Water heater size varied more among mobile home units than among public housing units, but not in a pattern related to unit size.

Drug storage was considered adequate in one-third of the mobile homes and in all public housing units. Mobile homes utilized shelves and cabinets; public housing units had conventional medicine cabinets.

Maximum occupancy varied considerably between mobile homes and public housing (see Table 12). Different standards can be utilized to

TABLE 12

Maximum Occupancy by Bedroom Space, Total Space, and Closet Hanging Space

Maximum Occupancy	Bedroom Space	Total Space	Closet Space
Mobile Home			
one	1		
two	6		
three	10	1	
four	4	2	4
five		3	5
six		14	5
seven		1	4
eight			2
nine			1
Public Housing			
one			
two			
three			
four	6		2
five	2		2
six		2	2
seven	7	2	4
eight		8	
nine			2

determine maximum occupancy. The three used in this study were total space, space in bedrooms, and hanging space in closets. Therefore, some variation did result according to the standard applied. When total space was the standard utilized, the majority of the mobile homes had space for six occupants, while public housing units had total space sufficient for six to eight persons. When units were classified on the basis of number of bedrooms, maximum occupancy variations occurred. According to the standard used, 50% of the two bedroom mobile home units evaluated had total space sufficient for six occupants, while one unit could accommodate only three. Seventy-five percent of the three bedroom and all the four bedroom mobile home units could accommodate six occupants. According to recommendations utilized, two bedroom public housing units had total space adequate for six or seven persons; three and four bedroom units met total space standards for eight-person-occupancy. When optimal occupancy was evaluated on the basis of bedroom size, none of the mobile homes had bedrooms large enough to accommodate two occupants. All public housing units had at least one bedroom with space adequate for two persons.

Bedroom space in the housing units evaluated met recommendations more adequately in public housing than in mobile homes. The public housing units more adequately met total space recommendations for a larger number of persons than did the mobile homes evaluated in this study.

Closet hanging space was adequate for four to nine occupants in all mobile homes and public housing units.

Regardless of the number of bedrooms, maximum occupancy in all units was lower when the criteria for evaluation was a composite of the three standards used here. On this basis mobile homes could accommodate from one to four occupants and public housing from four to nine occupants (see Table 12).

Window space in mobile homes met recommendations for adequacy in all the living rooms, in approximately one-third of the bedrooms, but in none of the bathrooms. Window space throughout public housing units met the recommended space standards in almost all instances.

General storage space was deficient in almost all mobile homes and adequate in all public housing units evaluated.

Total square footage in the kitchen was greater in public housing units than in mobile homes. When this space was evaluated in terms of work centers and activity space, facilities were far more adequate for use in the mobile homes. A summary of kitchen storage, and activity space of the two types of housing units examined is presented in Table 13.

Adequacy of work centers within kitchens was evaluated as follows:

1. In units having kitchen arrangements of cabinets at right angles to each other or to appliances, mobile homes met the recommendations more frequently than did public housing units.



TABLE 13

## Summary of Kitchen Storage and Activity Space

Between Counters or Appliances at Right Angles
Between Counters or Appliances Opposite Each Other
Between Dining Table and Wall or Counter Back
Passageway Beside Table
Base Cabinet Frontage
Latch Side of Refrigerator
Right Side of Sink
Left Side of Sink
Space for Mixing Food
Range (for setting food)
Serve-Range Center: Wall Storage
Serve-Range Center: Base Storage
Sink - Mix Center: Wall Storage
Sink - Mix Center: Base Storage
Total: Wall Storage
Total: Base
Dinnerware Storage

## MOBILE HOMES

percentage meeting or exceeding recommendation	78	0	43	52	90	67	28	57	33	64	99	33	85	28	100	33	44
--	----	---	----	----	----	----	----	----	----	----	----	----	----	----	-----	----	----

## PUBLIC HOUSING

percentage meeting or exceeding recommendation	75	25	0	25	33	33	33	67	0	50	100	25	85	8	83	17	33
--	----	----	---	----	----	----	----	----	---	----	-----	----	----	---	----	----	----

2. Passageway space on two sides of the dining table was more adequate in mobile homes than in public housing units.
3. Base cabinet frontage was greater in mobile homes than in public housing units.
4. Space on the latch side of refrigerator, for mixing food, and space beside the range met the recommended standard in mobile homes more often than in public housing.
5. The amount of counter space on each side of the sink differed very little between mobile homes and public housing units.
6. Wall storage space in the serve-range center was considered adequate in almost all of the mobile homes and public housing units. Base cabinet storage space in this center was sufficient in only a small percentage of both types of units.
7. Wall storage space in the sink-mix center was adequate in the same proportion of each of the type units evaluated. Mobile homes more frequently than public housing units had adequate base storage in the sink-mix center.
8. A higher percentage of the mobile home units than public housing had both total wall and base storage space sufficient to meet the recommended standards. All mobile homes met the space standard for total wall storage.
9. The mobile home units more frequently than public housing supplied dinnerware storage space adequate to meet the recommendations.

### Conclusions

By recommended standards used in this study for space and facilities, mobile homes were adequate in many aspects, particularly in storage space. The bedrooms generally offered only space enough for sleeping. Other activities such as studying must take place outside the bedroom. Mobile homes generally had a more efficient use of space within them than did public housing units.

The one area where mobile homes appeared to be least adequate, according to the standards used in this study, was in square footage of bedroom space. One must remember that facilities are built into bedrooms in mobile homes, thus reducing the square footage of open areas. In public housing these facilities are provided through free-standing pieces of furniture. If the square footage of space used for furniture in public housing were subtracted from total square footage of floor space, the difference in maximum occupancy between the two types of housing would not be as great.

The square footage of kitchens was less in mobile homes than in public housing units; however, the cabinet frontage and total work and storage space was greater.

Mobile homes had better planned work centers and storage space within the kitchen than did public housing units.

The way in which space was utilized in mobile homes seems to provide greater utility in storage and kitchen activity space than that in public housing.

Even though total space within the mobile homes evaluated was less than in the public housing, the storage space and kitchen activity centers have greater potential for effective use.

This evaluation of space adequacy indicated that mobile homes marketed in Greensboro, North Carolina, can more adequately meet housing needs of families than public housing in this city currently does. They should be considered as at least a partial solution to the housing problem faced by low-income families of two to six in size.

#### Recommendations

It is recommended that future studies of space in these two types of housing include a measurement of space which in mobile homes is utilized through built-in furniture, and in public housing is open space used for free standing furniture.

Since housing standards are utilized for comparing structures of different types as well as for evaluating an individual dwelling, it is recommended that space in rooms include space occupied by built-in furniture.

Mobile home manufacturers should attempt to increase unit size or redistribute existing space to afford more space in bedrooms.

It is recommended that individuals involved in planning public housing units utilize to better advantage principles of design and current knowledge of space use to make these units more functional and effective for habitancy.



Standards used in this evaluation were representative but not inclusive of housing standards currently in use. Additional investigation should be undertaken using standards for other aspects of housing, such as privacy from sound, psychological impact of amount of space, adequacy for families of different compositions, and structural standards.

There is a wealth of opportunity for home economists, either in volunteer or employment situations, to assist families living in public housing units to better utilize existing space for storage and work centers. This should be considered as a project for students enrolled in teacher and extension education programs.

Robinson, R. E. Characteristics of mobile and similar homes. Journal of Housing Research, 1968, 22, 10-22.

Robinson, R. E. Mobile homes. **BIBLIOGRAPHY**. Journal of Housing Research, 1968, 22, 10-22.

Agan, T. and Luchsinger, E. The house: Principles resources and dynamics. Philadelphia and New York: J. B. Lippincott, 1966.

Beyer, G. H. Housing: A factual analysis. New York: Macmillan, 1958.

Beyer, G. H. Housing and society. New York: Macmillan, 1965.

Edwards, C. W. The changing scene in family housing. Mobile Home/Travel Trailer Dealer, April 5, 1968, 19, 40-52.

FHA dangles its mortgage bait at the mobile home industry. House and Home, June 1968, 34, 18.

Greensboro Daily News. (North Carolina), June 14, 1968, 95.

Greensboro Daily News. (North Carolina), A growing trend: Homes on wheels are mushrooming. August 29, 1968, D 10.

Durham County Planning Department. Mobile homes: County development advisory II. Greensboro, North Carolina.

Kaplan, W. H. Kitchen planning standards. Circular C5.32, Illinois Small Homes Council: March, 1965.

Klaxia, J. The back page. American Builder, June, 1968, 101, 78.

McCullough, H. E. Cabinet space of the kitchen. Circular C5.31, Illinois Small Home Council: February, 1949.

McCullough, H. E. Space design for household storage. University of Illinois Agricultural Experiment Station Bulletin No. 567. August, 1952.

Mobile homes: Threat or opportunity? American Builder, July, 1967, 100, 56-57.

Mobile Home Manufacturers Association. Flash facts about mobile homes. Chicago: June, 1968. (a)

Mobile Home Manufacturers Association. News. Chicago: June, 1968. (b)

O'Neill, R. W. There's a big difference between sticking your head in the sand and keeping an eye to the ground. House and Home, August, 1965, 28, 77.

Pickett, M. S. Evaluation of storage and counter space. Journal of Home Economics, 1960, 52, 35-37.

Radigan, F. M. Mobile home. Building Research, 1968, 5, 41-44.

## BIBLIOGRAPHY

- Agan, T. and Luchsinger, E. The house: Principles resources and dynamics. Philadelphia and New York: J. B. Lippincott, 1965.
- Beyer, G. H. Housing: A factual analysis. New York: Macmillan, 1958.
- Beyer, G. H. Housing and society. New York: Macmillan, 1965.
- Edwards, C. W. The changing scene in family housing. Mobile Home/Travel Trailer Dealer, April 5, 1968, 19, 40-52.
- FHA dangles its mortgage bait at the mobile home industry. House and Home, June 1968, 34, 18.
- Greensboro Daily News. (North Carolina), June 14, 1968, B5.
- Greensboro Daily News. (North Carolina), A growing trend: Homes on wheels are mushrooming. August 29, 1968, D 10.
- Guilford County Planning Department. Mobile homes: County development advisory II. Greensboro, North Carolina.
- Kaple, W. H. Kitchen planning standards. Circular C5.32, Illinois Small Homes Council: March, 1965.
- Kizzia, J. The back page. American Builder, June, 1968, 101, 78.
- McCullough, H. E. Cabinet space of the kitchen. Circular C5.31 Illinois Small Home Council: February, 1949.
- McCullough, H. E. Space design for household storage. University of Illinois Agricultural Experiment Station Bulletin No. 557. August, 1952.
- Mobile homes: Threat or opportunity? American Builder, July, 1967, 100, 56-57.
- Mobile Home Manufacturers Association. Flash facts about mobile homes. Chicago: June, 1968. (a)
- Mobile Home Manufacturers Association. News. Chicago: June, 1968. (b)
- O'Neill, R. W. There's a big difference between sticking your head in the sand and keeping an eye to the ground. House and Home, August, 1965, 28, 77.

- Pickett, M. S. Evaluation of storage and counter space. Journal of Home Economics, 1960, 52, 35-37.
- Radigan, F. M. Mobile home apartments. Building Research, 1968, 5, 41-44.
- The nation and its poor get their greatest housing bill. House and Home, September, 1968, 34, 7.
- U. S. Bureau of Census, Housing Census: 1960.
- U. S. Bureau of Census: Statistical Abstract of the United States: 1968. (8th Ed.), Washington: 1968.
- U. S. Department of Health, Education and Welfare. APHA-PHS recommended housing maintenance and occupancy ordinance (first revision of a proposed housing ordinance), Washington: 1967.
- U. S. Department of Housing and Urban Development. Federal Housing Administration. Minimum property standards for low cost housing, Washington: 1967.
- U. S. Department of Housing and Urban Development. Federal Housing Administration. Minimum property standards for one and two living units, Washington: 1965.
- Washington highlights. Mobile Home/Travel Trailer Dealer, March 5, 1968, 19, 24-26.
- Washington highlights. Mobile Home/Travel Trailer Dealer, May 5, 1968, 19, 14-16.
- What the new mobile home construction standard means. Mobile Life, July, 1967, 8, 29.
- Young, Jr., W. Whitney Young reviews poverty war. Journal of Housing, 1965, 22, 586.



## APPENDIX A

Checklist for Evaluating Space and Facilities of  
Mobile Homes and Public Housing

This checklist was developed to evaluate the storage space and facilities of mobile homes and public housing units. All the standards utilized were derived from published recommendations of the American Public Health Association-Public Health Service, Federal Housing Administration, and the Illinois Small Homes Council. It will be used to evaluate overall space and facilities, storage and work space in the kitchen, and storage for clothing, linen, cleaning tools and miscellaneous items found in a home. Dimensions typed in are taken from standards utilized in developing this checklist.

Brand _____	Certified MHMA _____
Price: Furnished _____	Unfurnished _____
Total space _____	Facilities installed _____
(150 sq. ft. 1st. occupant, 100 sq. additional occupant)	range _____
Living room space _____	radiant heat _____
Amt. window space _____	refrigerator _____
Openable window space _____	cooling _____
Ceiling height _____	other appliance _____
Linen storage _____	plumbing _____
Bathroom space _____	water heater capacity _____
Amt. window space _____	Electric service amps _____
Openable window space _____	(3 watts/sq. ft. of floor space.)
Drug storage _____	light fixtures per room _____
General storage _____	wall or floor outlets _____
(50 cubic feet)	
Number of bedrooms _____	
(70 sq. ft. 1st. occupant, 50 sq. ft. each additional occupant.)	
BR 1 space _____	BR 3 space _____
closet sp. _____	closet sp. _____
window sp. _____	window sp. _____
openable _____	openable _____
gen'l storage _____	gen'l storage _____
(50 cubic ft.)	(50 cubic ft.)
BR 2 space _____	BR 4 space _____
closet sp. _____	closet sp. _____
window sp. _____	window sp. _____
openable _____	openable _____
gen'l storage _____	gen'l storage _____
(50 cubic ft.)	(50 cubic ft.)

APPENDIXES

## APPENDIX A

Checklist for Evaluating Space and Facilities of  
Mobile Homes and Public Housing

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Brand \_\_\_\_\_  
 Price: Furnished \_\_\_\_\_  
 Total space \_\_\_\_\_  
 (150 sq. ft. 1st. occupant,  
 100 ea. additional occupant)  
 Living room space \_\_\_\_\_  
 Amt. window space \_\_\_\_\_  
 Openable window space \_\_\_\_\_  
 Ceiling height \_\_\_\_\_  
 Linen storage \_\_\_\_\_  
 Bathroom space \_\_\_\_\_  
 Amt. window space \_\_\_\_\_  
 Openable window space \_\_\_\_\_  
 Drug storage \_\_\_\_\_  
 General storage \_\_\_\_\_  
 (50 cubic feet)

Number of bedrooms \_\_\_\_\_  
 (70 sq. ft. 1st. occupant,  
 50 sq. ft. each additional  
 occupant.)

BR 1 space \_\_\_\_\_  
 closet sp. \_\_\_\_\_  
 window sp. \_\_\_\_\_  
 openable \_\_\_\_\_  
 gen'l storage \_\_\_\_\_  
 (50 cubic ft.)

BR 2 space \_\_\_\_\_  
 closet sp. \_\_\_\_\_  
 window sp. \_\_\_\_\_  
 openable \_\_\_\_\_  
 gen'l storage \_\_\_\_\_  
 50 cubic ft.)

Certified MHMA \_\_\_\_\_  
 Unfurnished \_\_\_\_\_  
 Facilities installed \_\_\_\_\_  
 range \_\_\_\_\_  
 vented heat \_\_\_\_\_  
 refrigerator \_\_\_\_\_  
 cooling \_\_\_\_\_  
 other appliance \_\_\_\_\_  
 plumbing \_\_\_\_\_  
 water heater capacity \_\_\_\_\_

Electric service amps \_\_\_\_\_  
 (3 watts/sq. ft. of floor space.)  
 light fixtures per room \_\_\_\_\_  
 wall or floor outlets \_\_\_\_\_

BR 3 space \_\_\_\_\_  
 closet sp. \_\_\_\_\_  
 window sp. \_\_\_\_\_  
 openable \_\_\_\_\_  
 gen'l storage \_\_\_\_\_  
 (50 cubic ft.)

BR 4 space \_\_\_\_\_  
 closet sp. \_\_\_\_\_  
 window sp. \_\_\_\_\_  
 openable \_\_\_\_\_  
 gen'l storage \_\_\_\_\_  
 (50 cubic ft.)

## APPENDIX A--Continued

## Activity space

Access space between cabinets or appliances at right angles

38" liberal \_\_\_\_\_ 34" medium \_\_\_\_\_ 30" minimum \_\_\_\_\_

Work area counters or appliances opposite each other

60" liberal \_\_\_\_\_ 54" medium \_\_\_\_\_ 48" minimum \_\_\_\_\_

Dining area table to wall or counter back

36" liberal \_\_\_\_\_ 30" medium \_\_\_\_\_ 26" minimum \_\_\_\_\_

Dining area passageway along table

44" liberal \_\_\_\_\_ 36" medium \_\_\_\_\_ 30" minimum \_\_\_\_\_

## Kitchen space

Base cabinet frontage \_\_\_\_\_

Houses under 1,000 sq. ft., 6 feet.

Houses 1,000-1,400 sq. ft., 8 feet.

Houses over 1,400 sq. ft., 10 feet.

Area Counter frontage	Measured space	Minimum	Medium	Liberal
Latch side of refrigerator _____		15"	15"	18"
Right side of sink _____		26"	30"	36"
Left side of sink _____		18"	24"	30"
Space for mixing food _____		36"	36"	42"
Range (for setting food) _____		15"	18"	24"
Beside oven (built-in) _____		15"	15"	18"

Storage space, combined centers

Ample space: limited supplies

Serve-Range

Sink-Mix

Total

Wall 24" \_\_\_\_\_

30" \_\_\_\_\_

4' 6" \_\_\_\_\_

Base 39" \_\_\_\_\_

93" \_\_\_\_\_

11' 0" \_\_\_\_\_

Minimum space: limited supplies

Serve-Range

Sink-Mix

Total

Wall 18" \_\_\_\_\_

24" \_\_\_\_\_

3' 6" \_\_\_\_\_

Base 33" \_\_\_\_\_

69" \_\_\_\_\_

8' 6" \_\_\_\_\_

Dinnerware storage requirements (in addition to above).

Ample space				Minimum space			
Place settings				Place settings			
4	6	8	12	4	6	8	12
24" _____	36" _____	48" _____	72" _____	21" _____	30" _____	42" _____	60" _____

## APPENDIX B

## Deviation From Recommended Space Standards for Selected Data

Mobile Homes	Total Space	Living Room Window	Linen Storage	Bath Window Space	General Storage
TWO BEDROOM UNITS	- 30	+ 7	0	-3.2	-19
	+ 78	+53.2	0	-1.2	-17
	+270	+28.4	+6	-1.9	-14
	+150	+32.4	-8	- .8	-50
	+150	- 2.4	-8	-2.0	- 6
	+270	- 1.6	-8	-5.0	-28.5
	+270	+29.4	0	-5.7	+11
	+198	+18.6	+4	-5.7	-25
	+ 54	+ 3.6	-8	-2.0	-50
	+270	+ 4.8	0	-2.9	+ 2
THREE BEDROOM UNITS	+ 22	+ 9.6	0	-2.2	- 2
	- 38	+ 4.8	-8	-2.7	-50
	+ 70	+44.4	0	-3.7	- 8
	+ 70	+16.7	0	-4.4	-12
	- 26	+ 6.6	0	-3.1	-31.5
	+ 70	+10.8	0	-4.4	-18
	+ 70	+ .6	0	-4.2	-50
FOUR BEDROOM UNITS	+ 70	+ 8.4	0	-4.1	- 4
	+ 70	+10.8	-4	-4.1	-24
	+ 70	+39.6	+12	-5.3	-14
Public Housing	+ 70	+16.8	+4	-3.6	-25
TWO BEDROOM UNITS	+350	+ 4.4	+16	0	+ 22
	+246	+ 6.4	+24	+ .5	+190
	+350	+ 4.4	+24	0	+ 22
	+245	+ 6.4	+24	+ .5	+238
THREE BEDROOM UNITS	+350	+ 2.5	+28	+ .5	+223
	+350	+ 2.5	+28	+ .5	+223
	+350	- 2.1	+16	-1.25	+ 63
	+350	+ .9	+16	+ .5	+326
FOUR BEDROOM UNITS	+350	+ 4.4	+16	+9.9	+310
	+350	+ 4.4	+20	+9.9	+310
	+450	+ 4.6	+20	-2.0	+230
	+300	+ 3.9	+20	+2.1	+510



## APPENDIX B--Continued

## Deviation from Recommended Space Standards for Selected Data

Mobile Homes	Hanging Closet	BR 1		Hanging Closet	BR 2	
		Window	General Storage		Window	General Storage
TWO BEDROOM UNITS	0	+3.2	-47	+6	- .1	-50
	0	+7.9	+34	0	+ 7.9	+34
	+4.0	-1.0	-32	+4	- 1.6	-35
	0	+2.6	-41	0	+ 2.4	-41
	+1.0	-1.8	-40	+2	- 6.0	-38
	+5.0	-1.5	-42	+2	- 2.8	-42
	+4.0	+8.4	-34	+4	- 3.8	-41
	+3.0	+2.0	-32	+2.5	- 2.3	-38
	+2.0	+6.4	-44	-2	+ .3	-44
	+8.0	-3.2	-42	+2	- 3.4	-35
THREE BEDROOM UNITS	+5	+22	-42.5	0	+ 1.2	-40
	+6	+ 7.1	-36.5	+6	+ 7.0	-36.5
	+4	- 1.5	-29	0	- .8	-42
	+4	- .1	-32	0	- 1.1	-38
	+6	+ 1.0	-40	-5.0	- 1.1	-44
	+4	+ 3.4	-38	0	+ 1.2	-38
	-2	+ .8	-47	-2.0	+ 5.7	-47
	+4	- 2.1	-38	+2	+ .6	-38
FOUR BEDROOM UNITS	+4	+ .3	-38	+2	0	-38
	+2	- 1.6	0	0	- .5	-22
	+6	- 1.2	- 4.2	+5	+ 3.4	-35
Public Housing						
TWO BEDROOM UNITS	+2	+ 6.8	-30	+2	+ 9.0	-30
	+2	+11.0	-30	0	+10.1	-30
	+2	+ 6.8	-30	+2	+ 8.0	-30
	+2	+ 3.7	-30	0	+10.1	-30
THREE BEDROOM UNITS	+7	+ 8.0	-20	0	- 1.2	-30
	+7	+ 8.0	-20	0	- 1.2	-20
	+2	+ 9.0	-20	0	+10.4	-20
	+2	+ 7.4	-20	0	+10.4	-20
FOUR BEDROOM UNITS	0	+ 8.1	-30	+7	-30	-30
	0	+ 8.1	-30	+7	-30	-30
	-2	+ 5.7	-30	+2	-30	-30
	-2	+ 3.9	-30	+2	-30	-30

## APPENDIX B--Continued

## Deviation from Recommended Space Standards for Selected Data

Mobile Homes	Hanging Closet	BR 3 Window	General Storage	Hanging Closet	BR 4 Window	General Storage
TWO BEDROOM UNITS						
THREE BEDROOM UNITS	+1.0 +6.0- -4.0 0 +2.0 0 -2 -4.0	+9 +7.8 + .8 +1.0 -1.1 +3.2 -2.3 + .8	-40 -36.5 -44 - 8 -38 -30 -47 -44			
FOUR BEDROOM UNITS	-2 +2 +6	+1.4 +3.2 +2.0	-44 -34 -50	-2 +2 +6	+1.4 +3.2 +2.0	-44 -34 -50
Public Housing						
TWO BEDROOM UNITS						
THREE BEDROOM UNITS	+7 +7 -3 -3	+1.2 +1.2 +11.2 +11.9	-30 -30 -30 -30			
FOUR BEDROOM UNITS	+2 +1 0 0	+11.2 +11.2 + 8.8 + 8.9	-30 -30 -30 -30	0 0 -2 -1	+11.0 +11.0 +11.0 +10.6	-20 -20 -20 -20

## APPENDIX C

## Combined Storage Space Within Center and Total Storage Space

Mobile Homes	Serve-range	Sink-mix	Total
1	78"	72"	11'6"
2	0"	84"	11'0"
3	60"	106"	14'6"
4	33"	91"	16'3"
5	64"	73"	13'4"
6	108"	84"	16'0"
7	108"	132"	20'10"
8	120"	116"	20'8"
9	48"	60"	9'0"
10	82"	88"	14'6"
11	87"	88"	15'9"
12	54"	72"	12'0"
13	51"	77"	13'6"
14	54"	129"	15'0"
15	70"	118"	16'6"
16	78"	82"	14'6"
17	45"	111"	13'0"
18	69"	100"	13'6"
19	78"	156"	19'6"
20	72"	168"	17'0"
21	76"	116"	16'2"
Public Housing			
1	48"	72"	10'
2	36"	18"	4'6"
3	48"	72"	10'0"
4	36"	18"	4'6"
5	48"	104"	12'8"
6	48"	104"	12'8"
7	64"	90"	13'2"
8	60"	48"	9'0"
9	63"	102"	14'0"
10	63"	102"	14'14"
11	72"	120"	16'0"
12	48"	72"	10'0"